

REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

In the specification, paragraphs have been amended on pages 1-3, 18-19, 20, 28, 31 and 33-35.

Claims 1-5, 12-17, 24, 26-29, 36-37 and 39-42 are currently being amended. The specification and claims have been amended to correct a clerical error in the translation for the present application from the Japanese priority documents, without narrowing the scope of the claims. No new matter has been added.

This amendment changes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 1-48 are now pending in this application.

Rejections under 35 U.S.C. § 102

Claims 1-48 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,412,458 to Kawasaki et al. (“Kawasaki”). Applicants respectfully traverse this rejection for at least the following reasons.

Independent claim 1 is directed to an apparatus for estimating a residual gas amount of an internal combustion engine provided with a variable valve mechanism that varies at least an operating characteristic of an intake valve. The claim 1 apparatus comprises “a residual gas amount calculating unit that calculates a valve opening area during a valve overlap time based on detected valve operating characteristic, and calculates a residual gas amount of the engine based on calculated valve opening area and said actual intake air amount of the engine.” Thus, in claim 1, the calculated valve opening area during a valve overlap time is

based on detected valve operating characteristic, and calculates a residual gas amount of the engine based on calculated valve opening area and said actual intake air amount of the engine.” Thus, in claim 1, the calculated valve opening area during a valve overlap time is one of parameters used for calculating a residual gas amount. Kawasaki fails to disclose at least this feature of claim 1.

Kawasaki discloses estimating an internal EGR quantity. The internal EGR quantity is estimated as a sum of a base quantity and an increase correction quantity determined in accordance with a valve overlap period, its middle angular position in crankshaft rotation, and intake pressure (See abstract).

Even if the internal EGR quantity of Kawasaki could be considered to be a residual gas amount, however, Kawasaki does not disclose anything about using a valve opening area during a valve overlap time as a parameter to calculate the residual gas amount (internal EGR quantity). Thus Kawasaki fails to anticipate claim 1.

Moreover, Kawasaki fails to realize the specific advantage of the claim 1 apparatus in providing high accuracy in the estimation of the residual gas amount. A “valve opening area” is a value reflecting not only the valve overlap time period but also the valve lift amount etc. during that time period. Thus, the residual gas amount can be calculated with high accuracy by using “a valve opening area” as a parameter as in claim 1. Kawasaki fails to realize this advantage.

Independent claims 12, 13, 24, 36 and 37 include limitations regarding calculating the valve opening area and the residual gas amount based on the calculated valve opening area corresponding to those limitations in claim 1, and are thus patentable for analogous reasons. The dependent claims ultimately depend from one of independent claims 1, 13, 24 and 37 and are patentable for analogous reasons as well as for further patentable features recited therein.

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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